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PATENT SPECIFICATION

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COMPLETE SPECIFICATION

DRAWINGS ATTACHED

Fourdrinier Wires for Paper-making Machines

I, HENRY JOHNSON, a Canadian Citizen, whose post office address is: 530 De Courcelle Street, Montreal 30, Quebec, Canada, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:

This invention relates to improvements in Fourdrinier wires for paper-making machines and particularly to such improvements as will contribute to the elimination of wire marks on the forming sheet of paper.

The wire marks transmitted to the sheet of paper as it is formed on the Fourdrinier wire of the machine, and particularly on newsprint paper, results from the wet pulp being moulded into the crevices at the cross-over of the warp and weft strands of the Fourdrinier wire. These wire marks are partially smoothed out by the press rolls of the paper machine, but not entirely so. The wire marks result in minute depressions over the whole surface of the finished paper sheet, particularly on the side of the paper which has been in contact with the Fourdrinier wire. Thus, when the sheet is printed on, and particularly in the printing of photographs, the ink will not flow into these minute depressions with the result that the printing will become blurred. A close examination of the printing on opposite sides of a sheet will reveal that the printing on the side of the sheet which has been in contact with the Fourdrinier wire is considerably more blurred than the printing on the side of the sheet which was not in direct contact with the Fourdrinier wire.

The present invention has as its aim the formation of a monoplane surface along the lines of the warp and weft strands of the wire, this being effected on the paper carrying surface of the wire or on both surfaces of the wire. The essential characteristics of the wire are set out in claim 1 of the specification and are obtained by applying a synthetic resinous material to the Fourdrinier wire in such a manner that the synthetic resinous material will adhere to the surface of the warp and weft strands of wire and will fill in the depressions at the cross-over of the strands and between the knuckles of the strands to the level of a longitudinal surface plane of the wire as defined by the crests of the knuckles. The synthetic resinous material is applied to the wire in such a manner that the drainage openings in the wire are not reduced in area, the application of the synthetic resinous material being preferably carried out by spraying one or both surfaces of the wire and keeping the drainage openings free of synthetic resinous material by passing hot air through the wire while the synthetic resinous material is still hot and pliable.

Some examples of Fourdrinier wires in accordance with the invention are illustrated in the accompanying drawing, in which:

Fig. 1 is an enlarged plan view of a section of a Fourdrinier wire showing the synthetic resinous material applied to the warp and weft strands to fill in the depressions at the cross-over of the wires;

Fig. 2 is a vertical cross section taken on the line 2-2 in Fig. 1;

Fig. 3 is an enlarged vertical cross section taken on the line 3-3 in Fig. 2;

Fig. 4 is a vertical cross section similar to Fig. 2 but showing the synthetic resinous material applied on both surfaces of the wire;

Fig. 5 is an enlarged vertical cross section taken on the line 5-5 in Fig. 4; and

[Price 4s. 6d.]

Fig. 6 is similar to Fig. 3 but showing a flat top surface to the synthetic resinous material.

The Fourdrinier wires shown in the drawing are woven in any desired type of weave, for example, plain or twill, and are here shown as being woven with a twill weave having warp strands 5 and weft strands 6.

The wire illustrated in Figs. 1-3 has synthetic resinous material applied to the paper supporting side 7 of the wire in such a manner that the depressions between the knuckles 8 of the warp strands 5 and the knuckles 9 of the weft strands 6 at each cross-over of the strands is filled up by the individual deposits or fillings 10 of the synthetic resinous material. Each of the individual deposits 10 of the synthetic resin is the same width as the diameter of the wire strand at the point of cross-over of the wires and tapers off towards the crest of the knuckles of the strands. The deposits or fillings 10 are preferably rounded off at their top surface 11, as shown in Fig. 3, so as to assist in the free flow of the water through the drainage openings 12 of the wire.

During the application of the synthetic resinous material to the surface of the strands, preferably by spraying, there will be a tendency for the synthetic resin to adhere to the surfaces of the warp and weft strands defining the depressions between the knuckles of the strands and, because of the downward slope of the surface of any one strand from the crest of the knuckle to the point of cross-over of the adjacent strand, the soft and pliable synthetic resin will tend to build up vertically in the depression against the surface of the said adjacent cross-over strand, and across the full width of the cross-over strand. The build-up of the synthetic resin in the depressions will also tend to taper-off, from the full width of the strands at the bottom of the depressions at the point of cross-over of the strands, inwardly towards the vertical plane passing through the axis of the strands, and in the direction of the crest of the knuckles of the strands, in the manner shown in Fig. 1. Any build-up of the synthetic resinous material above the longitudinal surface plane of the wire can be removed by a wiping action while the synthetic resin is still hot and pliable. Such wiping action will tend to flatten the top surface of the deposits of synthetic resin as shown at 13 in Fig. 6. Flattening can also be accomplished by rolling or grinding. Such flattening of the top surface of the finished wire will provide a greater area of support for the pulp fibres without reducing the area of the drainage openings 12.

The volume of synthetic resinous material deposited can be restricted in well known manner such as by spraying the woven wire with the said material and then passing hot air through the mesh while the material is still hot and pliable in order that the drainage openings will not be restricted.

In Figs. 4 and 5 the synthetic resinous material is shown applied to both surfaces of the Fourdrinier wire. In this case the top surfaces of the strands 5 and 6 are covered by the individual deposits 14 of synthetic resin and the bottom surfaces by the individual deposits 15. These individual deposits 14 and 15 may or may not meet at the longitudinal axis of the strands at 16.

Synthetic resinous materials which are considered satisfactory for the carrying out of this invention include epoxy-modified phenolic resins, epoxy-modified polyamide resins, epoxy-modified ester resins, polyurethane resins and epoxy-modified polyester resins. These synthetic resinous materials, after being applied to the wire mesh, are cured by baking in an oven at from 375° to 425°F. The time required to effect curing of the synthetic resinous material is from ten to fifteen minutes depending on the specific material used.

By filling the crevices at the cross-over of the warp and weft strands with a deposit of synthetic resinous material, a monoplane surface is created along each strand which will hold the fibres of the wet pulp to the plane of the paper carrying surface of the Fourdrinier wire without reducing the area of the drainage openings in the wire. The synthetic resinous deposits, by preventing the wet pulp from falling into the crevices at the cross-over of the wire strands will thereby eliminate the minute depressions in the finished paper and so provide a smoother and better inking surface.

Furthermore, by filling in the crevices at the cross-over of the wire strands there will be a tendency for less turbulence in the water drawn through the wire and therefore less disturbance in the lay of the fibres of the pulp with consequent improvement in the qualtiy of the formed sheet of paper.

When a printed impression is made on both surfaces of the improved paper sheet formed on a Fourdrinier wire of the type described above, the printed impression will have the same degree of clarity on both sides of the sheet, and will be particularly noticeable in the printing of photographs on newsprint paper.

Although in most cases the synthetic resinous material will be applied to the wire, or to each side of the wire, in a single spraying operation, it is also possible to build up the fillings or deposits in two distinct steps. Thus, a polyvinyl butyral resin

can first be applied to the wire as a wash primer, this being followed by the application of a vinyl chloride-vinyl acetate copolymer resin as a topcoat to build up the individual fillings to the correct size. A urea alkyd resin can also be used as a topcoat over a primer of polyvinyl butyral resin in the same way.

WHAT I CLAIM IS:

1. A Fourdrinier wire comprising woven warp and weft strands which combine to form a series of depressions under a longitudinal surface plane of the woven wire, the said depressions being formed between the crests of the knuckles of the warp and weft strands at their point of cross-over with each other, in which the depressions each contain a filling of synthetic resinous material having a width not greater than the diameter of each individual wire strand and extending along the surface of the individual warp and weft strands from the crest of the knuckle of one strand to the crest of the knuckle of the adjacent cross-over strands so as to fill the depression, the filling extending vertically from the surface of the strands to the level of a longitudinal surface plane of the Fourdrinier wire as defined by the crests of the knuckles of the individual warp and weft strands.

2. A Fourdrinier wire according to claim 1, in which the filling material fills the depressions under both longitudinal surface planes of the wire.

3. A Fourdrinier wire according to claim 1, in which the surface of the filling in each depression is level with the said longitudinal surface plane of the wire but is rounded.

4. A Fourdrinier wire according to any one of claims 1-3, in which the individual fillings extend along the longitudinal axis of the warp and weft strands to blend with the adjacent fillings at the said longitudinal surface plane of the wire.

5. A Fourdrinier wire according to claim 1, in which the fillings fill the depressions on the paper forming surface of the wire.

6. Fourdrinier wires substantially as described with reference to Figs. 1-3, Figs. 4 and 5, or Fig. 6 of the accompanying drawing.

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1 SHEET

COMPLETE SPECIFICATION

This drawing is a reproduction of the Original on a reduced scale.

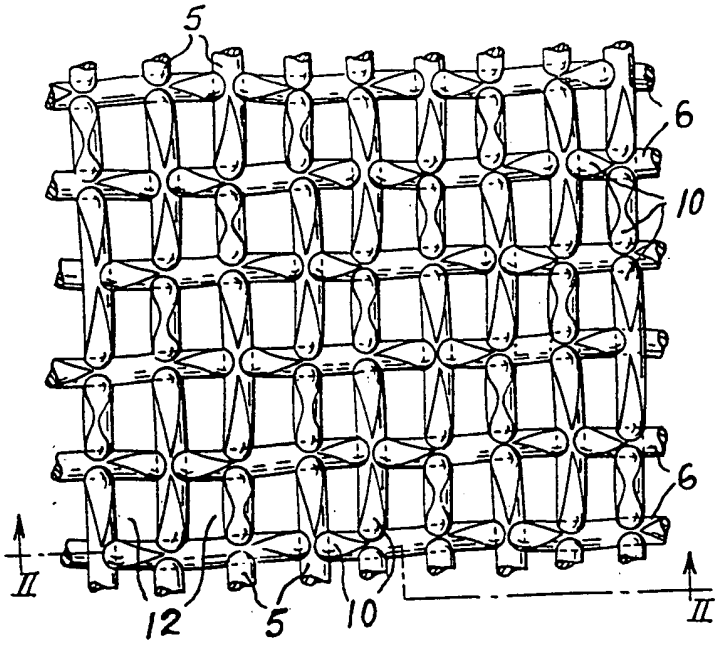

Fig. 1

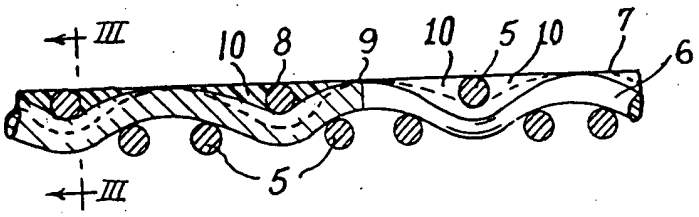

Fig. 2

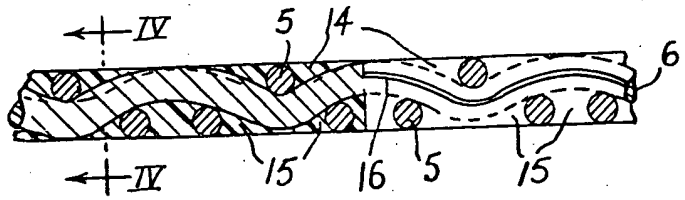

Fig. 4

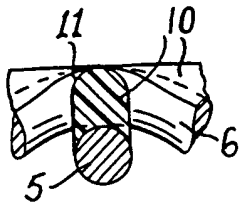

Fig. 3

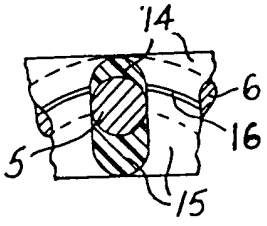

Fig. 5

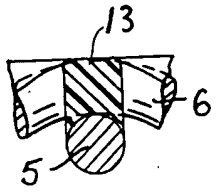

Fig. 6